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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,699	02/05/2004	Leroy M. Edwards	8540G-000156	5123
27572                      7590                      06/15/2009 HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 828 BLOOMFIELD HILLS, MI 48303				
EXAMINER				
WALKER, KEITH D				
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1795				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/772,699

**Applicant(s)**

EDWARDS ET AL.

**Examiner**

KEITH WALKER

**Art Unit**

1795

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5, 7, 9-13, 15, 17, 18 and 20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7, 9-13, 15, 17, 18 and 20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/808)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

Claims 1-5, 7, 9-13, 15, 17, 18 and 20 are pending examination as discussed below.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 9 & 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitation "at least one of the first enclosure and the second enclosure" is unclear and so is indefinite for not distinctly claiming subject matter regarded as the invention. It is unclear if applicant is trying to claim an alternative limitation where one of a list is chosen or if both enclosures are required. If the former then alternative language like "or" should be used. If both components are required then the phrase "at least one" is unnecessary since both components are required. The claim will be interpreted as being alternative such that only one of the first or second enclosures is required.

### ***Claim Interpretation***

Based on applicant's arguments of 3/11/09, the following interpretation is presented for clarification. The term passive vent is interpreted as meaning the vent itself is passive. As disclosed in the instant specification in paragraph [0020], "As used

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herein 'passive' means that the hydrogen vent does not require any electrical or other active components to function. For example, the hydrogen vent 88 requires no electrical components such as a sensor, controller, or fan are required." So the vent itself needs to be passive and not consist of an electrical component; however, other electrical components used in the system are not precluded.

***Claim Rejections - 35 USC § 102/103***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 4, 5, 7, 11-13 & 15 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 2005/0058861 (Pettit).

Pettit teaches a fuel cell system with a hydrogen flow path for the anode and a coolant flow path for cooling the fuel cell (Abstract, Fig. 1). The coolant flow path has a

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reservoir and as such a first enclosure that encompasses part of the coolant flow path (Figs. 1-3; [0021,0024]). The reservoir has a passive vent that passes any gas, including hydrogen, from the coolant stream. The fuel cell system has a second enclosure that encompasses a part of the hydrogen flow path and a second hydrogen vent (70) ([0030, 0031]). The hydrogen concentration is kept below 4% and preferably 1% ([0032]).

***Claim Rejections - 35 USC § 103***

3. Claims 10 & 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2005/0058861 (Pettit) in view of US Patent 4,168,349 (Buzzelli).

The teachings of Pettit as discussed above are incorporated herein.

Pettit is silent to the vent configured to as a flame barrier.

Buzzelli teaches a hydrogen vent that acts as a flame and explosion barrier (2:55-65). Using a hydrogen vent that also blocks flames increases the safety of the fuel cell system.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the vent of Pettit with the flame barrier vent of Buzzelli to improve the safety of the fuel cell device.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 2005/0058861 (Pettit) in view of US 2002/0160245 (Genc).

The teachings of Pettit as discussed above are incorporated herein.

Pettit is silent to the vent comprising a metal, plastic or cellulose.

Genc teaches a fuel cell system with a cooling loop for the fuel cell. The cooling loop includes a passive gas vent that enables the passage of gas but not liquid (Abstract, Fig. 1, [0007, 0010]). Hydrogen is part of the gas that is present in the cooling system liquid and so the vent is a hydrogen vent. The hydrogen vent is a porous material made of plastic or metal and is located in the wall of the coolant reservoir (Figs. 2-6; [0021-0023]). Using this selectively permeable membrane keeps the fuel cell system safe by allowing the unwanted gas to pass thereby reducing the buildup of explosive gas such as hydrogen, while keeping the wanted coolant liquid.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the vent of Walsh with the selectively permeable membrane taught by Genc to improve the efficiency and safety of the fuel cell system by keeping the wanted substances and allowing the unwanted substances to pass.

5. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 2005/0058861 (Pettit) in view of US Patent 4,168,349 (Buzzelli) as applied to claim 17 above and further in view of US 2002/0160245 (Genc).

The teachings of Pettit and Buzzelli as discussed above are incorporated herein.

Pettit is silent to the vent comprising a metal, plastic or cellulose.

Genc teaches a fuel cell system with a cooling loop for the fuel cell. The cooling loop includes a passive gas vent that enables the passage of gas but not liquid

(Abstract, Fig. 1, [0007, 0010]). Hydrogen is part of the gas that is present in the cooling system liquid and so the vent is a hydrogen vent. The hydrogen vent is a porous material made of plastic or metal and is located in the wall of the coolant reservoir (Figs. 2-6; [0021-0023]). Using this selectively permeable membrane keeps the fuel cell system safe by allowing the unwanted gas to pass thereby reducing the buildup of explosive gas such as hydrogen, while keeping the wanted coolant liquid.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the vent of Pettit with the selectively permeable membrane taught by Genc to improve the efficiency and safety of the fuel cell system by keeping the wanted substances and allowing the unwanted substances to pass.

6. Claims 9 & 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2005/0058861 (Pettit) in view of US 2003/0118881 (Walsh).

The teachings of Pettit as discussed above are incorporated herein.

Pettit is silent to a third enclosure with a third hydrogen vent.

Walsh teaches a fuel cell system that has multiple components for operation of the fuel cell. The fuel cell system can be integrated by housing the whole system in one common enclosure ([0009]). This third enclosure would allow for easy integration of the fuel cell system into an apparatus requiring electrical power. As taught by Pettit, each enclosure should include a vent for expelling hydrogen so dangerous levels of hydrogen do not build up.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the fuel cell system of Pettit with the whole system enclosure taught by Walsh to easily integrate the system into an apparatus.

7. Claims 1, 2, 4, 7, 9, 11, 12, 16 & 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0118881 (Walsh).

Walsh teaches a fuel cell comprising a hydrogen flow path that feeds the anode of the MEA (Fig. 3, [0036]). A first enclosure encompasses a water reservoir that contains the water recovered from the fuel cell and has a vent in the wall configured to vent hydrogen and other gases present in the reservoir. The vent prevents the buildup of combustible gases and therefore the vent is configured to maintain the hydrogen concentration below 4 percent, since any amount would be an accumulation of combustible gases ([0037]). A water trap is a second enclosure that encompasses the water flow path and the hydrogen flow path (Fig. 3). A third enclosure is used to encompass the entire fuel cell system as an integrated fuel cell system ([0009]).

Walsh is silent to using the collected water in the reservoir as a coolant. However, it is well-known in the art to collect bi-product water and condensate water from the fuel cell and exhaust streams and use the water as part of a cooling system. As the water reservoir is already established, it would be obvious to one skilled in the art at the time of the invention to use the collected water as the coolant for the fuel cell system. Utilizing the excess water increases the efficiency of the system by using the bi-products for other system requirements. Combining prior art elements according to



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known methods to yield predictable results and using known techniques to improve similar devices in the same way are considered obvious to one of ordinary skill in the art (KSR, MPEP 2141 (III)).

Walsh is silent to the water trap and the third enclosure having a hydrogen vent. However, Walsh does teach that the anode exhaust contains combustible gases and a water tank is used to prevent the combustible gases going into the water tank. Walsh also teaches using a vent to prevent buildup of combustible gases in water tanks. Since the buildup of combustible gases is taught as dangerous and a third enclosure is used to house the entire fuel cell system, a hydrogen vent located in the housing would prevent the hydrogen from building up in the housing and creating an explosive situation.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the water trap and third enclosure taught by Walsh with a vent that vents hydrogen and other gases to keep the threat of explosions down in the system ([0037]).

8. Claims 1, 2, 4, 7, 9, 11, 12, 16 & 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0118881 (Walsh) in view of US 2003/0232228 (Grasso).

The teachings of Walsh as discussed above are incorporated herein.

Walsh is silent to using a coolant loop with the fuel cell system.

Grasso teaches a cooling loop with a fuel cell system to regulate the temperature of the fuel cell ([0002]). As the coolant is passed through the fuel cell stack, gas

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bubbles from the stack become entrained in the coolant stream. So a coolant reservoir with a vent is taught (Figs. 1, 2; [0014]). The coolant reservoir separates the gas from the coolant and allows the gases such as hydrogen, pass through the vent. As the process continuously runs and the vent is always operating, the hydrogen gas cannot build up to levels of 4% or 1%. Removing the gas from the coolant improves the cooling affect of the liquid because the liquid will be more efficient and easier to pump ([0002, 0017]).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the fuel cell system of Walsh with the cooling system of Grasso to regulate the fuel cell stack temperature and use a cooling system that is more efficient because the gas is eliminated from the cooling fluid.

9. Claims 1, 2, 4, 7, 9, 11, 12, 16 & 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0118881 (Walsh) in view of US 5,623,390 (Noda).

The teachings of Walsh as discussed above are incorporated herein.

While Walsh teaches venting to prevent a buildup of explosive gases, which would include a buildup of hydrogen below a concentration of 4 percent and 1 percent. However, Walsh is silent to the explicit levels of hydrogen being kept below 4 percent and 1 percent.

Noda teaches an electrochemical device that expels hydrogen and is surrounded by an enclosure. The build up of hydrogen gas within the enclosure becomes unsafe due to the explosive nature of hydrogen. Therefore, hydrogen vents are used to pass

the hydrogen gas out of the battery and then out of the enclosure. The concentration of hydrogen gas is kept to below 4 percent and preferable below 3 percent to prevent the enclosure from reaching an explosive concentration of hydrogen (9:5-25). Claims that differ from the prior art only by slightly different ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art. (MPEP 2144.05) Discovery of optimum ranges of a result effective variable in a known process is ordinarily within the skill of art and selection of the optimum ranges within the general condition is obvious. (MPEP 2144.05)

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the vent of Walsh with the hydrogen vent of Noda to prevent a build up of hydrogen gas within the enclosure, creating an explosive atmosphere. Combining prior art elements according to known methods to yield predictable results and using known techniques to improve similar devices in the same way are considered obvious to one of ordinary skill in the art (KSR, MPEP 2141 (III)).

10. Claims 1, 2, 4, 7, 9, 11, 12, 16 & 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0118881 (Walsh) and US 2003/0232228 (Grasso) in view of US 5,623,390 (Noda).

The teachings of Walsh and Grasso as discussed above are incorporated herein.

While Walsh teaches venting to prevent a buildup of explosive gases, which would include a buildup of hydrogen below a concentration of 4 percent and 1 percent.

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However, Walsh is silent to the explicit levels of hydrogen being kept below 4 percent and 1 percent.

Noda teaches an electrochemical device that expels hydrogen and is surrounded by an enclosure. The build up of hydrogen gas within the enclosure becomes unsafe due to the explosive nature of hydrogen. Therefore, hydrogen vents are used to pass the hydrogen gas out of the battery and then out of the enclosure. The concentration of hydrogen gas is kept to below 4 percent and preferable below 3 percent to prevent the enclosure from reaching an explosive concentration of hydrogen (9:5-25). Claims that differ from the prior art only by slightly different ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art. (MPEP 2144.05) Discovery of optimum ranges of a result effective variable in a known process is ordinarily within the skill of art and selection of the optimum ranges within the general condition is obvious. (MPEP 2144.05)

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the vent of Walsh with the hydrogen vent of Noda to prevent a build up of hydrogen gas within the enclosure, creating an explosive atmosphere. Combining prior art elements according to known methods to yield predictable results and using known techniques to improve similar devices in the same way are considered obvious to one of ordinary skill in the art (KSR, MPEP 2141 (III)).

11. Claims 10 & 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0118881 (Walsh) in view of US 5,623,390 (Noda) as applied to claims 1 & 16 respectively and further in view of US Patent 4,168,349 (Buzzelli).

The teachings of Walsh and Noda as discussed above are incorporated herein.

Walsh is silent to the vent configured to as a flame barrier.

Buzzelli teaches a hydrogen vent that acts as a flame and explosion barrier (2:55-65). Using a hydrogen vent that also blocks flames increases the safety of the fuel cell system.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the vent of Walsh with the flame barrier vent of Buzzelli to improve the safety of the fuel cell device.

12. Claims 3, 5 & 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0118881 (Walsh) in view of US 5,623,390 (Noda) as applied to claims 1, 2, 4 & 12 respectively and further in view of US 2002/0160245 (Genc).

The teachings of Walsh and Noda as discussed above are incorporated herein.

Walsh is silent to the vent comprising a metal, plastic or cellulose.

Genc teaches a fuel cell system with a cooling loop for the fuel cell. The cooling loop includes a passive gas vent that enables the passage of gas but not liquid (Abstract, Fig. 1, [0007, 0010]). Hydrogen is part of the gas that is present in the cooling system liquid and so the vent is a hydrogen vent. The hydrogen vent is a porous material made of plastic or metal and is located in the wall of the coolant

reservoir (Figs. 2-6; [0021-0023]). Using this selectively permeable membrane keeps the fuel cell system safe by allowing the unwanted gas to pass thereby reducing the buildup of explosive gas such as hydrogen, while keeping the wanted coolant liquid.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the vent of Walsh with the selectively permeable membrane taught by Genc to improve the efficiency and safety of the fuel cell system by keeping the wanted substances and allowing the unwanted substances to pass.

13. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 2003/0118881 (Walsh) in view of US 5,623,390 (Noda) and US 4,168,349 (Buzzelli) as applied to claim 17 and further in view of US 2002/0160245 (Genc).

The teachings of Walsh, Noda and Buzzelli as discussed above are incorporated herein.

The teachings of Walsh and Noda as discussed above are incorporated herein.

Walsh is silent to the vent comprising a metal, plastic or cellulose.

Genc teaches a fuel cell system with a cooling loop for the fuel cell. The cooling loop includes a passive gas vent that enables the passage of gas but not liquid (Abstract, Fig. 1, [0007, 0010]). Hydrogen is part of the gas that is present in the cooling system liquid and so the vent is a hydrogen vent. The hydrogen vent is a porous material made of plastic or metal and is located in the wall of the coolant reservoir (Figs. 2-6; [0021-0023]). Using this selectively permeable membrane keeps

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the fuel cell system safe by allowing the unwanted gas to pass thereby reducing the buildup of explosive gas such as hydrogen, while keeping the wanted coolant liquid.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the vent of Walsh with the selectively permeable membrane taught by Genc to improve the efficiency and safety of the fuel cell system by keeping the wanted substances and allowing the unwanted substances to pass.

### ***Response to Arguments***

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection as required by amendment.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEITH WALKER whose telephone number is (571)272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

K. Walker

/PATRICK RYAN/  
Supervisory Patent Examiner, Art Unit 1795